The USER Model: A Design Thinking Management Tool for Product and Service Design

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In 2003, a survey of design practice within the UK Health Service examined the role of design and design thinking in improving patient safety in the NHS (Department of Health, 2003). They viewed design thinking in healthcare as:

...a structured process for identifying problems and developing, testing and evaluating user-focused solutions. It has been successfully used to transform products, services, systems and even entire organisations. When applied to healthcare, effective design thinking can deliver products, services, processes and environments that are intuitive, simple to understand, simple to use, convenient, comfortable and consequently less likely to lead to accidental misuse, error and accidents (Design Council, 2003, p. 9).

While institutions might aspire to integrate design thinking into the structure of their organization, a framework for delivering design thinking and analyzing the system in a user-centered way is difficult to manage and often generalized in its methodology. Over a decade after the Design Council’s statement, there is still a lot of room for improvement not only in healthcare but also other sectors. Design thinking is yet to take hold. Is a lack of a clear design thinking management framework to blame?

This paper will explain how two design thinking frameworks have been developed and combined to address the issue of managing the design thinking process, referred to as the USER model.
After reading this paper, readers will understand how this model was developed and how it can be used as a service design management tool for design thinking in product and service design.

**Keywords**: User Centered, Design Thinking, Service Design, Framework, Design Management

4c) The role of designers in the shift towards Product Service Systems

**Establishing a Design Thinking Methodology**

*A literature review of current design thinking models*

When organizing a design team, a shared frame of reference can aid collaboration and help manage the efforts of individuals. In a design thinking context, this is even more critical as teams are often multidisciplinary. Without a shared language between disciplines, evaluating a complex system that delivers the service outcome is a complicated task.

To enable this shared frame of reference, first a set of leading design thinking models will be explored. These models are then dissected for comparison with the aim to find commonality between the models and findings on design thinking research.

**Review of Design Thinking Models**

After establishing key aspects of the design process, design thinking models were reviewed to determine if they met the established criteria, and if not, how to build on the models to develop a framework for service design.

In order to compare the models, each were dissected according to three increasing units of measurement: activities, stages and phases.

*Activities* are the smallest unit and included research activities such as

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1 The models reviewed were from IDEO, SPARC, Stanford’s d.School, the Design Council, the American Institute of Graphic Arts (AIGA) and Barry & Beckman from Stanford and Berkeley Universities.
interviewing, storytelling and prototyping. Stages are a broader collection of activities that contribute to the same objective, such as information gathering or systems analysis. Phases are formed of stages with the aim to meet a larger goal for a business, such as developing a testable prototype or launching a new product to the public.

Looking at each model through this metric made it possible to compare and examine how each viewed the process of design thinking and then determined what aspects were most suitable for the objectives in the context of service design. (Figure 1)

![Activities - Stages - Phases]

*Figure 1. Three units of analysis were used to organise the research of design thinking models.*
• **IDEO Model**

[0 Activities, 7 Stages, 3 Phases]

The first model reviewed is the work of leading design thinking firm IDEO. Brown (2006, 15:44) outlined three phases in his IDEO design thinking model referred to as ‘inspiration, ideation and implementation’. Brown described these phases as having as a set of stages that included: Observe and Inquire, Tell Stories, Synthesize, Brainstorm, Experiment, Execute and Spread. (Figure 2)

![Figure 2. IDEO’s stages and activities of design thinking. (Brown, Innovation through Design Thinking, 2006, 15:44).](image)

In Brown’s IDEO model, design thinking is seen as a linear process that begins with observation and ends with executing and disseminating the end result.
**Stanford University D.School model**

[No specified Activities, 5 Stages, No specified Phases]

The second model (figure 3) reviewed the model of a leading design thinking academic program, Stanford University’s ‘D.School’ model. Here the design thinking process is organised into five stages: empathy > define > ideate > prototype > test (Kembel, 2009).

![Design Thinking Process Diagram](image)

**Figure 3. Stanford D.school views the design thinking process as an iterative cycle of empathy, definition, ideation, prototyping and testing (Kembel, Awakening Creativity 2009).**

In the D.School model, design thinking is seen as an iterative process that begins with empathy and ends with testing. Dissemination was not part of the model which would mean in the context of service design, another framework would be needed to see a project through to full completion.
Instead, this model is more academic in nature as opposed to delivering a solution to the public.

**SPARC Model**

[No specified Activities, 5 Stages, No specified Phases]

Looking at healthcare based design methodologies, Mayo Clinic’s design service ‘SPARC’, organised design thinking into five stages:

See → Plan → Act → Refine → Communicate

They described this design methodology as building a relationship between empathetic observation and prototyping (Brennan, Duncan, Armbruster, Montori, Feyereisen, & LaRusso, 2009, p. 5). This model was similar to IDEO and D.School methodologies but with the outcome to ‘spread’ through communication.

**Design Council model**

[13 Activities, 4 Stages, 0 Phases]

The national strategic body for design in the UK, the Design Council has produced several case studies on the use of design in industry and healthcare (Design Council, 2009) (Design Council, 2010). The Design Council developed a model of the design process after conducting a qualitative study of leading global brands and assessing their design process. Their study noted that ‘despite years of extensive research undertaken since the 1950s, there was no single model which was agreed to provide a satisfactory description of the design process’ (Design Council, 2007).

The result was a design process model that looked at the process of design as using four alternating stages of divergent and convergent methods, known as the ‘Double Diamond’ design model. (Figure )

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2 Companies included in the study were: Alessi, BSkyB, BT, LEGO, Microsoft, Sony, Starbucks, Virgin Atlantic, Whirlpool, Xerox, Yahoo!
Figure 4. The ‘double diamond’ design process model by the Design Council is a series of diverging and converging activities that include ‘discover’, ‘define’, ‘develop’ and ‘deliver’ stages (Design Council, Eleven Lessons: Managing design in eleven global companies, 2007).

Each stage had a unique purpose and was organised into the following activities:

1. Discover Stage Activities
   - Market research
   - User research
   - Managing information
   - Design research groups

2. Define Stage Activities
   - Project development
   - Project management
   - Project sign-off

3. Develop Stage Activities
   - Multi-disciplinary working
   - Visual management
   - Development methods
   - Testing

4. Deliver Stage Activities
   - Final testing, approval and launch
   - Targets, evaluation and feedback loops

This model was useful in that it was the product of practice-based and evidence-based research of how to integrate a design process into products and services. It also provided a list of design activities and an order of stages in which to manage them.
**AIGA model**

[No identified Activities, 12 Stages, 3 Phases]

The American Institute of Graphic Artists (AIGA) is the US equivalent of the Design Council. The AIGA produced a design process model called 'Design for Success' where 12 stages were outlined for bringing a project from conception to delivery, with the intent of encouraging business to work with designers throughout the development process (AIGA, 2004) (Table 1)

The AIGA model was similar to the Design Council’s model, with the difference that AIGA stages didn’t specify design activities and had a very linear approach. The AIGA model also included non-design aspects of a project such as buy-in and marketing which would be useful in a business context.
Table 1. AIGA ‘Design for Success’ was arranged into 12 stages that were contained within three phases: ‘defining’ (1-4), ‘innovating’ (5-8) and ‘generating value’ (9-12).

**Barry and Beckman model**

[No identified Activities, 4 Stages, No identified Phases]

After looking at the design thinking models of IDEO, Stanford, the Mayo Clinic, the Design Council and the AIGA, it was found that these design thinking models were not clearly connected to academically founded frameworks. Barry and Beckman (2008) proposed a model that bridged that gap by connecting two bodies of academic work—a design model by Charles Owen (Illinois Institute of Design) and David Kolb’s experiential learning theory to view of the process and organisation underlying design thinking (Barry and Beckman, 2004).

This model divided the design process into four stages: observations, frameworks, imperatives and solutions. Barry and Beckman considered that
observations were about ‘problem finding’, frameworks were about ‘problem selecting’, imperatives were about ‘solution finding’ and solutions were about ‘solution selecting’. (Figure 2)

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**Figure 2.** Barry and Beckman viewed design thinking as problem and solution finding and selecting (Barry, Michael; Beckman, Sara L., Developing Design Thinking Capabilities, 2008).

Barry and Beckman visualised the design process as alternating between the concrete and the abstract, and analysis and synthesis in an iterative loop. (Table 2) They also gave examples of the types of activities to be included in each stage, to act as an illustration of the process.
### Table 2. Barry and Beckman’s design thinking process model organised according to category, goal and type.

This model defined design thinking stages in a more general sense making it easier to categorise activities. However, it’s broad definitions would also made it difficult for a design team to clearly understand how to apply the process.

**Model Comparison**

A comparison chart was used to identify the structural differences for each model between activities (A), stages (S) and phases (P). (Figure ) These models were then overlaid onto a single framework to create a combined model for design thinking based on three units of activities, stages and phases. Each model used a different structure for the design thinking process, which revealed little consensus between frameworks.
To understand how to combine the models, a framework needed to be established. For this, it's important to understand the process of how designers think, so that the combined model would reflect a true design thinking approach.

Nigel Cross is considered the ‘grandfather of design thinking’ and conducted several observational research studies exploring the unique characteristics of designers in creative problem solving. Three key attributes of the design process emerged in these studies, which established a standard to evaluate design thinking models.

First, Cross (2000, p. 3) found that designers often began their design process by assuming a problem is ill-defined. Designers demonstrated this by challenging initial assumptions to establish what the ‘right’ or ‘best’ problem was to solve. This mentality was exhibited when designers would change the goals and constraints of a given problem, even when they could have been treated as well-defined problems (Cross, 2000, p. 3).

Second, Cross (ibid, p. 5) found that designers create ‘problem-solution’ pairs through partially structuring the problem and then using that partial structure to create a solution (Cross, 2000, p. 5). This indicated that a
designer would not need a complete understanding of the problem before proposing initial solutions. This finding meant that the design thinking process would need to be flexible so that one could jump between two notional ‘problem’ and ‘solution’ spaces rather than take a linear approach. Cross and Dorst (2001) further investigated designers’ routes of inquiry and found that designers moved between problem and solution spaces through an iteration of analysis, synthesis and evaluation.

According to Cross (1997), when these three factors combined—questioning the problem, finding a problem-solution pair, iterating and making the thinking tangible—it lead to a ‘creative leap’. He described this as a conceptual bridge which ‘recognisably embodies satisfactory relationships between problem and solution’.

This indicated that not only would the design process be iterative rather than linear, it would also need to alternate between analysis, synthesis and evaluation methods in order for the creative solution to be found.

Finally, Cross (2000) found that successful designers used a structured flexible process, as opposed to none or one that was rigid:

Following a reasonably-structured process seems to lead to greater design success. However, rigid, over-structured approaches do not appear to be successful. The key seems to be flexibility of approach, which comes from a rather sophisticated understanding of process strategy and its control.

Therefore, one would need to establish a design thinking process that would be flexible but structured enough to guide the research and design activities.

In addition to these discoveries, Brown (2009b) asserted that a unique attribute of a designer’s process is to employ tactile methods because ‘as designers, we learn our ideas by making them and building them. We use prototyping as our learning process’. Therefore, prototyping or making would also need to be part of a design thinking process.
Summary of design thinking processes

Summarising the findings discussed, a ‘design thinking’ model would need to have the following characteristics:

- have a human-centred approach, focused on meeting user needs by implementing research activities to discover and provide solutions for those needs.
- be flexible and iterative, rather than linear. This would account for the ‘natural process’ of designers where problems and solutions developed together in pieces rather than sequentially as a whole.
- include tangible activities, such as prototyping, to take advantage of a designer’s tactile learning and production skills.
- incorporate several types of thinking, such as scientific, systematic and design thinking as part of a multidisciplinary approach.
- collaborate with various disciplines and understanding the context of the problem in the system would be important to ensure against unfair bias and to create holistic solutions.
Building a new design thinking model on an academic framework

*Organising the activities*

First, a problem and solution space was made, based on Nigel Cross’s findings:

![Diagram of Problem Space and Solution Space]

The Barry and Beckman model added to Cross’s model by contributing analysis and synthesis stages, along with concrete and abstract stages, that could be used as criteria for organising design and research activities in each quadrant:
Then the activities of the models were incorporated under the Barry and Beckman design thinking criteria:
However, knowing that designers learn through making (Brown, 2009), it would mean that no stage of the design thinking process would be completely ‘abstract’ or ‘concrete’. So what other criteria would help to define the different stages of the design thinking process?

Organising the stages

In a user-centred model, the first step in the design thinking process would dictate beginning with the user and understanding their needs as a basis for exploring the right question to ask (Kach, Azadegan, & Chethan, 2009, p. 18). So the first stage was labeled ‘User’.

The User stage is about gaining empathy for the User’s needs on emotional, physical and cognitive levels as the IDEO and D.School models described. This can be achieved through activities mentioned in all of the models such as market research, ethnography, first-hand experience and user testing.

Knowing that a user cannot operate in isolation, the next step would be to understand the user within their environment. This next stage is about discovering the connections between the users in the system. Drawing from the reviewed design thinking models, this can be achieved through activities such as storytelling, placing large statistics or figures in context, event and relationship mapping.

Once the user is understood in context, it’s then possible to define the problem and create a set of criteria for what a successful outcome could be. This was named the Establish stage as it is about identifying the goals to be accomplished—or in other words deciding what the best question is to explore for the best solution—after investigating the problem in context from a user centred perspective. Activities in this stage are more administrative in nature as tasks are organized to aid solution seeking activities. Such as refining a clear persona to guide the team in a user-centred way, determining value and agreeing ideal scenarios for success for the user and stakeholders, and setting goals and defining boundaries such as deadlines, resources and other project management concerns.

Once a direction has been established, the next stage is about creating tangible solutions that can be tested and explored in a concrete way. Using
the activities described previously in the models, this includes visualization methods such as sketching, prototyping and modelling.

In the first step a minimum viable product (Ries, 2009) could be produced which would then be tested using the USER model stages again until a production-ready solution was developed.

After these stages were defined, the ‘USER model’ emerged, standing for User, System, Establish and Realise, making it possible to organise the four stages of design thinking in a human-centred way. Each stage contained a set of activities, which alternated between analysis-synthesis and concrete-abstract. This clearly defined framework allows flexibility in adapting to various situations making it a useful tool for a broad number of design thinking missions. Drawing from the leading design thinking models, it combines design thinking activities whilst maintaining a user-centred vision. (Figure 7)

![Figure 7. Diagram of the USER model, which organises design thinking and design producing activities according to problem or solution stages, abstract and concrete stages, and analysis and synthesis stages. Typically, after an issue has been identified for investigation, the model would begin with the User](image-url)

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stage and then cycle through to the Realise stage. However, it’s not anticipated that it would occur in an orderly, regimented fashion, rather it would progress between problem and solution halves according to the project needs. (Illustration by Author)

Organising the phases

Brown’s description of the evolution of the design thinking process was described as as three phases referred to as ‘inspire, evolve and validate’ (Brown, 2006). As the goal of a project would be to form a consensus and a defined outcome, Brown reasoned each phase would need to increase in synthesis. (Figure 8)

Figure 8. IDEO’s design thinking phases increased in synthesis as a project progresses (Brown, 2006).
In the first phase, activities and project management is geared towards gaining inspiration and insight. According to Ries (2009) a common outcome of this first phase would be a Minimum Viable Product ‘which allows a team to collect the maximum amount of validated learning about customers with the least effort’.

Once an MVP is created it needs to be tested with Users, returning to the first stage of the design thinking model. In this second cycle, activities are centred on improving the initial prototype with users, in the context of a system and establishing a refined set of criteria for further improvements on the MVP.

Since design thinking is an iterative process, after the MVP is improved in the Realise stage – Phase Two, the team will test it again. It may loop through a number of times, undergoing several refinements before the solution is ready for the Validation phase. Once the solution has been validated, it’s then ready to be managed by the stakeholders or users the solution was designed for which may or may not evaluate and continue to seek improvements to the solution. (figure 9)

**How is this model used?**

From a project management point of view, in a team setting different people could manage each section of the process by deploying their own set of activities that meet that stage’s objectives and then bringing them back to the team for discussion and review.

The model provides a flexible structure to allow teams to organise their own design thinking activities based on the skills of the team and the resources available. For example, if a team member proposes that they create a prototype of a solution, and another suggests that a market survey should be done, the team can place those activities physically onto the framework. This would communicate to the team that certain aspects of design thinking were being ignored in the process allowing any member of the team to propose ideas to address those gaps.

However, what is critically missing from this model is a framework that could organise and identify all the users and factors involved in a system.
during Stage Two. This would be essential in order to successfully coordinate a team to investigate the service from multiple stakeholders and user viewpoints. Is the team testing the prototype with the full set of users involved? Is the market research addressing insights in only a few areas of the system needed to understand the problem? Without such a framework the whole model falls apart.
The USER Model

'USER' stands for 'User System Establish Realise', which represents the four stages of design thinking.

Each stage has a set of activities, which alternate between analysis—synthesis and concrete—abstract.

When four stages are completed, it forms a phase. Each phase increases in progress from inspire to implement to validate.

'USER' Research & Design Activities

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<thead>
<tr>
<th>PROBLEM STAGES</th>
<th>SOLUTION STAGES</th>
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<tbody>
<tr>
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<td>Market Research</td>
<td>Scenario Creation</td>
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<tr>
<td>Ethnography</td>
<td>Determining Value</td>
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<td>First-hand Experience</td>
<td>Goal Setting</td>
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<td>User Testing</td>
<td>Personas</td>
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<td>System</td>
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<td>Storytelling</td>
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<td>Relationship Mapping</td>
<td>Modelling</td>
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'USER' Innovation Management Phases

In a design thinking model, the goal is to develop a product/service that has been developed, tested and found to be successful with users. Once the project has reached success, it is transferred to entrepreneurial and business activities to bring it to market.
Figure 9. Description of the USER model. (Illustration by Author)

Adding a Systems Design Component

According to Professor Lucian Leape (2007, p. 10) of the Harvard School of Public Health, ‘Human beings make mistakes because the systems, tasks and processes they work in are poorly designed (Department of Health, 2007, p. 10). Understanding how to design the system for success then, is a critical issue for service designers.

To assess whether one is viewing the whole problem in context, a framework is needed to visualise the connections within a system. According to Tarbox (2006), ‘activity theory’ meets this need:

Designers have indeed used various prescriptive, longstanding methods in approaching a piece. Activity theory, and the model it provides, enhances this process and gives a means to visualise and organise it in a more instructional way. Furthermore, it expands the process and helps identify tensions that might exist between the segments of the audience, subject, or object, thereby enabling [designers] to make decisions based on the total environment and context of a piece, and ultimately making it more effective (Tarbox 2006, p. 80).

Tarbox viewed activity theory as a heuristic device to organise elements in a system and identify conflicts (or possibilities) in context. Design psychologist Don Norman (2005), also stated the framework of activity theory was useful in overcoming an over-dependence on user feedback or design ego, leading to more balanced user-centred solutions. Norman (2009) described this as looking beyond the singular:

A systems analysis goes beyond the design of individual screens or actions. It considers the entire experience from start to finish: thought through action through reflection. To make this a whole, seamless, coherent experience requires considering each action, each system response, each message—whether verbal or visual, silent or audible, visceral or behavioural, haptic or happenstance—all as part of the whole. Make sure that each message is consistent with the others in tone, voice, locus, and message. All steps must be readily accommodated, with the system always anticipating and ready for whichever choice the person makes. This is what it means to be a system: to think of everything (Norman, 2009).
This statement meant that in order for a designer’s solution to be successful, one would ‘need to think of everything’. While that may be an ambitious goal, the concept is that a design team would need to be aware that a solution wouldn’t have adverse implications on other components of the system, which would need to anticipated in order to achieve a successful outcome.

- Exploring activity theory in a design context

So what is this ‘activity theory’ that Norman and Tarbox have described? Activity theory, also known as Cultural-Historical Activity Theory (CHAT), is a social theory focused on artefact-mediated and object-oriented activities. The concept being that one never reacts directly to the environment, but rather mediates the environment via culture, tools and signs (Helsinki, 2008). (Figure 10)

![Diagram](image)

Figure 10. The relationship between humans and objects of environment can be seen as mediated by cultural means, tools and signs. In this view, human action has a tripartite structure (Helsinki, 2008).

Activity theory is particularly relevant for designers who create tools and signs that often mediate an activity. According to activity theorist Liam Bannon, activity theory views objects in two major ways:

1. Objects are external tools that shape internal behaviours and processes— they shape the way people interact with reality.
2. Objects often change over time, being modified in new ways to reflect new needs or uses. Objects and tools are a tangible evidence
of the ‘accumulation and transmission of social knowledge’ (Bannon, 1997).

For example by using this in a healthcare context, a communication designer can create a chart (mediary object) that acts as a knowledge transfer object for patients to better understand the symptoms of breast cancer. The object may shape the behaviour of the patient by enabling them to recognise and report a symptom. The object may be a modification of previous symbols and signs prolific in society, (such as a pink ribbon) or create a new meaning for a familiar object (such as a lemon representing a breast). (Figure 11)

![Diagram](image)

*Figure 11. This diagram illustrates the simplified relationship between the designer (design team) and the patient/user in activity theory. (Illustration by Author).*

Yrjo Engestrom, a modern psychologist in activity theory, described the need for this view of thinking in object-oriented systems:

*Activity systems are driven by communal motives that are often difficult to articulate for individual participants. Activity systems are in constant movement and internally contradictory. Their systemic contradictions, manifested in disturbances and mundane innovations, offer possibilities for expansive developmental transformations (Engestrom, 2000).*

Being able to uncover these latent needs to discover ‘expansive developmental transformations’ a way to view these opposing elements is
needed. Design researcher Bonnie Nardi explained how activity theory views those artefacts within a system:

Activity theory proposes that activity cannot be understood without understanding the role of artefacts in everyday existence, activity theory is concerned with practice, that is, doing and activity, which significantly involve the mastery of...external devices and tools of labour activity (Nardi & Kuutti, 1996, p. 4).

In design, the role of artefacts is paramount but often poorly understood in context. Making activity theory an important part of delivering a holistic solution.

Activity theory acts as a framework for systems analysis on several levels:

• It identifies the components that comprise an activity within a system.
• It acts as a heuristic device for organising the actions of each person in the system and their relationship to objects, roles and laws (Tarbox, 2006, p. 78).
• It can also provide a systematic way to identify opportunities for research, and analyse how the work designed could be used in a systems context.

However, according to Rajkumar (2004), activity theory in its current form isn’t easily accessible for design. Rajkumar suggests that in order for activity theory to work for designers it needs to:

• Provide a clear way to operationalise the framework into a ‘how to’ method to integrate it into the design thinking process
• Improve the terminology—suggesting a more accessible language to describe aspects of the model (Rajkumar, 2004).

Taking these issues of operationalization and terminology into account, it was important to analyse the activity theory model and adapt it for design thinking.
Modifying the activity theory model for design

In the original activity theory triangle, the ‘Subject person’ acts on the ‘Object person’ in order to transform the activity by using mediating instruments to arrive at an outcome. (Figure ) These are influenced by rules, one’s community and the divisions of labour associated with the activity (Hardman, 2007, p. 111). In the context of design thinking in a healthcare setting, the designer is the subject who is developing communication instruments for the patient [object]. In order to do that successfully, one must navigate the political and social factors of rules, community and divisions of labour.

The terms ‘object’, ‘subject’ and ‘instruments’ in activity theory for instance, have a different meaning in the context of design and medicine (and other fields). The terms used by Engeström (Engeström, 2000) compared with the terms proposed in this paper are:

Figure 12. The structure of a human activity system (Activity Theory Triangle) This model illustrates the elements of activity systems that are used to understand the user. The Subject is the one that commissions or develops the project (such as a designer). The Object is the user (such as a patient). And in order to succeed, rules, community, labour and instruments must be factored in to understand how the user achieves the outcome (University of Helsinki, 2008).
The original model was then changed to fit the new terminology. (Figure 13)

Figure 13. Activity triangle for service design. This model illustrates the different components of an activity that need to be considered to understand the full context of a problem. This example more clearly shows where people are located in the system through visualising people. Illustration by Author based on (University of Helsinki, 2008).
An explanation of the model, through the environment of breast screening, is outlined below to illustrate how each element is defined in the context of this work:

**DESIGNER.** This is the person or group of persons that are responsible for the design of the service. This could be an entrepreneur, a designer or a team of researchers. An example of would be a design team who were tasked with improving the patient experience of breast screening.

**USER.** This is a person or group of persons that will receive the product or experience the service that has been created for them. Also known as the ‘target market’ or ‘audience’ it’s important that this person’s needs are met in order to achieve success on cognitive, emotional and physical levels. An example of a user would be a patient who participates in breast screening.

**COMMUNITY.** The community would be any person or group of people who are not the designer or the patient but are an influence in the service. While the degree to which each member of the community is involved in may vary, each can contribute to improving the activity through the roles they play. Examples of members of the community for breast cancer screening are the physician, screening technician, nurse, family, friends, health educator, maintenance staff and so on.

**RULES.** These include natural laws, man-made laws, cultural norms and social expectations that control the activity. Deadlines, intellectual property, safety, natural laws, theories, traditions and all are organized under this category. Examples of laws in breast cancer screening would include laws governing the use of mammography equipment, age requirements for patients, cancer risk factors, cultural taboos that restrict the display of breasts in public. Other rules would include restrictions on budgets that influenced what was purchased or the number of people employed to read mammograms.

**ROLES.** Looking at members of the community it is important to identify how the power is shared between them. This is often based on factors such as skills that a person has, their areas of expertise or
responsibility. Understanding what roles each person can play in the activity gives insight as to how to use people as resources in solving a problem. Examples of roles in breast cancer screening would be in understanding a radiologist’s role, or a task or skill required in their realm of responsibility such as reading a mammogram or reporting results to a patient which would be dependent on other roles in the service experience.

OBJECTS. These are the objects that are used to mediate the activity, also known as tools or instruments. This includes anything detected by the senses, such as smells, sounds or tactile materials. It’s often how these objects are designed that can affect the outcome of the activity. Examples of objects in breast screening would be a mammogram machine, a stethoscope, a patient’s chart, a website, a poster or a surgical gown. Examples of sensory objects would be the colour of the patient gown, branding devices, the smell of the screening room, the beep of a mammography machine when an x-ray is taken and the tone-of-voice that a nurse may use during the procedure.

The objects considered are often based on the bias of the designers involved in the process—i.e. a product design team is hired to design a new patient bed rather than solve the problem of better patient communication to help patients leave the hospital when they are ready.

USER NEEDS. The activity model compared with the Brown’s (2006, 21:00) five categories of user needs (Figure) fit well with the rules (cultural) and community (social) components. And in addition the activity model provides a way to view political needs through the roles category.

3 Note: these are not the stakeholders that would impact the success for the creator, such as investors or company CEO’s. For that, a separate activity triangle would be used, where the investor is placed in the creator’s role and the user is the CEO. Interestingly, overlapping these two triangles can offer insight on where common interests overlap.
Figure 14. IDEO’s user levels fit the categories of activity theory well, with the addition of a ‘political’ element in the activity triangle. Left image based on a drawing by Brown (Brown, 2006).

-Additional modifications to the activity theory model

In the original model, connections between people-to-people were shown. However, as laws, roles and objects cannot exist without humans, is it possible to connect with each other without them? By removing the direct people-to-people connections between in the model, it more clearly revealed how constraints, roles and objects could be used to mediate between people in the system. (Figure )
Figure 15. New activity theory model focused on constraints, roles and objects as the mediating forces between people (Illustration by Author).

Take for instance the case of a patient visiting her GP in the UK. By outlining some of the factors involved in this visit, one can diagram these factors on
the activity triangle and visualise the connections between the patient and elements of the system. Here are three examples of reasons why the patient may visit her doctor:

These three points can be visualised in the activity triangle, making it a useful heuristic device for analysing the system as part of a team. When these three issues are combined, it becomes clear which aspects of the system were not considered, making communication between designers and stakeholders clear. (Figure )
Figure 16. By overlaying the three examples in the previous figure, it becomes apparent which connections have yet to be considered in order to understand the ‘entire’ problem (Illustration by Author).

Finally, to make the framework more user-focused rather than object-focused, the model was visually re-arranged by placing the user ‘at the top’ of the triangle and moving the mediating forces between people literally between them. (Figure 17)
Exploring the relationships between the people, objects, rules, roles and factors in this modified design service triangle makes it easier to manage service design and research activities through a visual framework to picture the system. This tool has been used in healthcare and academic settings, guiding teams and individuals through the design thinking process.

Conclusion

The USER model has been designed to allow future frameworks to be added to help teams manage the process of design thinking in each stage. The User Activity Triangle is one illustration of this. A project management framework could help lead a team in the Establish stage in a more structured way, a prototyping framework for building models could also be added to the Realise stage. The adaptability of the model is clear and ready for others to adapt and build on the framework.
In practice, product/service design teams have found the USER model helpful in visualizing a problem and identifying potential areas for solutions (Fraher, 2014) (Robson, 2011). The USER model is continuing to be developed with healthcare professionals, entrepreneurs and university students as it’s applied to a wide range of problems.

Bibliography
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